

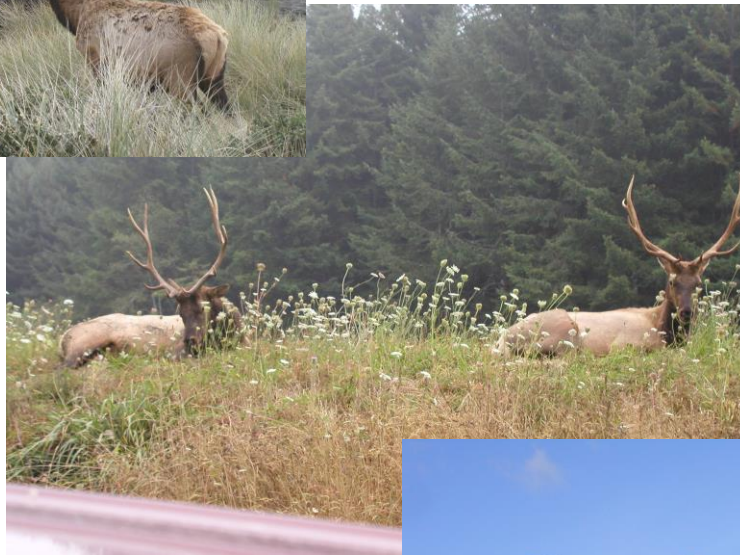
# Redwood

National and State Parks

National Park Service  
US Department of the Interior

Department of Parks and Recreation  
State of California

## 2005 HERD UNIT CLASSIFICATION OF ROOSEVELT ELK



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## INTRODUCTION

Historically, Roosevelt elk (*Cervus elaphus roosevelti*) were endemic to the redwood forest ecosystem in northwestern California. Prior to settlement by early American citizens in the 1850's, Roosevelt elk were hunted by the Native Americans, with presumably minimal impact to the elk population. In addition, the Chilula burned the prairies of the Bald Hills regularly, probably in order to make food and plant material gathering easier for the tribe, and promote grass growth to attract wildlife (i.e., elk and deer). However, from 1848 to 1855 market hunting for elk hide and meat to supply gold miners during the northern California gold rush significantly reduced elk populations and distribution (USDI 1983). When the gold rush was over, settlement began and a great deal of elk habitat was burned or logged and converted for ranching cattle and sheep, and crop land use.

The only Roosevelt elk populations that persisted through this period were those occupying coastal lowlands in the northern part of California, where dense forests and brush fields provided protective cover. Mandel and Kitchen (1979) estimated the elk population to be 1,000 to 1,300, with roughly half being located in and around Redwood National and State Parks (RNSP or "park"). RNSP's long-term goal for resource management is to restore and maintain the park's natural ecosystem as it would have evolved without modern human technology. This includes restoring elk herds to pre-settlement numbers and distribution and maintaining the population in equilibrium with the environment, regulated by habitat, predation, inter- and intra-specific competition and natural events.

Annual classification data of Roosevelt elk in Redwood National and State Parks has been undertaken since 1996 (Wallen 1997), in an attempt to document relative abundance and simple population characteristics, such as herd persistence as measured by cow numbers, recruitment and calf survival within known herds. While long term monitoring such as this helps managers understand basic elk population dynamics within the park, it is not intended to replace more detailed investigations and research of the Roosevelt elk population within the park.

## METHODS

A new methodology was implemented in 2005 as compared to all previous RNSP elk classification years. Using the suggested methodology described in Weckerly and Francis (2004) (Appendix I), the Bald Hills herd was counted in winter (January to February) while all the other monitored herds (see below) were counted in the fall (September to December) as they have been during all previous survey years. This recommended change in methodology was discussed in Bensen (2004) and follows Weckerly's (pers. comm.) recommendation based on his population research of the RNSP elk herds over the past ten years (Weckerly and Francis 2004).

Field visits to fall count herd areas from October through December were generally scheduled biweekly, however, some counts were made opportunistically while doing

other field work. The fall elk classification counts concentrated on six identified herd units (see below). Classification counts were performed by driving or hiking to the identified herd units, and also surveying historic and suspected areas where elk have traditionally congregated. Using binoculars and spotting scopes, observers reported the total number of elk observed, and also the total number of elk within each classification group (see below). The observers also assigned an observation ranking criteria value to the classification count, identifying the observer's confidence in the count data (see below). Other RNSP staff and visitors also opportunistically reported elk counts at known herd units, and elk sightings in lesser or unknown elk use areas. The highest reliable cow count survey was used as the herd size estimate for 2005.

#### *Fall Count Herd Units*

- (1) **South Operations Center (SOC)** herd
- (2) **Lower Redwood Creek** herd
- (3) **Davison Ranch/Berry Glen** herd (considered the same herds)
- (4) **Elk Prairie/101 Bypass** herd (considered the same herds)
- (5) **Gold Bluffs Beach** herd(s); (dispersed, several discrete herds)
- (6) **Crescent Beach Education Center (CBEC)** herd

#### *Fall Count Herd Classification Groups*

- **Cows** = all females >1 year old.
- **Calves** = young of the year (<1 year old; recognized early by spotted coat and small size; later the spots disappear, but they retain a short, rounded snout.)
- **Spikes** = year old males exhibiting only a main beam, brow tine absent.
- **Mature bulls** =  $\geq 2$  years, with brow tine evident off the main beam.

#### *Fall Count Herd Observation Ranking Criteria*

- 1 = Good**, visibility good and animals close enough to observe with high confidence accuracy.
- 2 = Fair**, animals are either distant or not fully cooperative for good confidence in classification (e.g. observation time is reduced due to movement into cover).
- 3 = Poor**, animals too far away (e.g. difficult to track individuals or animals are in adjacent hiding cover). Qualify the observation in the notes section.
- 4 = Unacceptable**, bad visibility due to darkness, fog, uncooperative animals.

Counts of the Bald Hills herd (which is made up of a variable number of discrete sub-herds) were made in early February using the methodology described in Weckerly and Francis (2004) (Appendix I). A set transect route was driven/walked once a day for ten survey days over two weeks. All elk seen were counted and classified into mature bulls (any elk with a brow tine evident off the main beam) and cows (all others, regardless of sex or age) using binoculars and field telescopes. All discrete sub herds seen during one survey day were lumped into a single number representing the entire Bald Hills herd. As

with the other herd counts, the highest reliable cow count survey was used as the year's herd size estimate for 2005.

## RESULTS

Classification counts were performed to determine the total number of elk within each herd unit and classification group (Table 1). Cow counts by year, the best indicator of herd persistence (Weckerly and Francis 2004, McCullough et al. 1994) are shown in Table 2. Those data were used to determine ratios of calves/cows (Table 3), and bull/cow ratios. The ratio of calves to cows is an indication of herd productivity.

**Table 1.** Highest number of elk reported within each herd unit and for each classification grouping in 2005. MB = mature bull, SP = spike, CW = cow, CV = calf, n = total surveys.

Location	MB	SP	CW	CV	Total	n
SOC	2	0	10	4	16	7
Lower Redwood Creek	3	3	22	4	32	9
Bald Hills*	15	N/A	241	N/A	256	10
Davison Ranch	10	1	17	2	30	15
Elk Prairie	2	1	5	0	8	6
Gold Bluffs Beach	1	0	14	3	18	11
CBEC	4	0	30	0	34	2

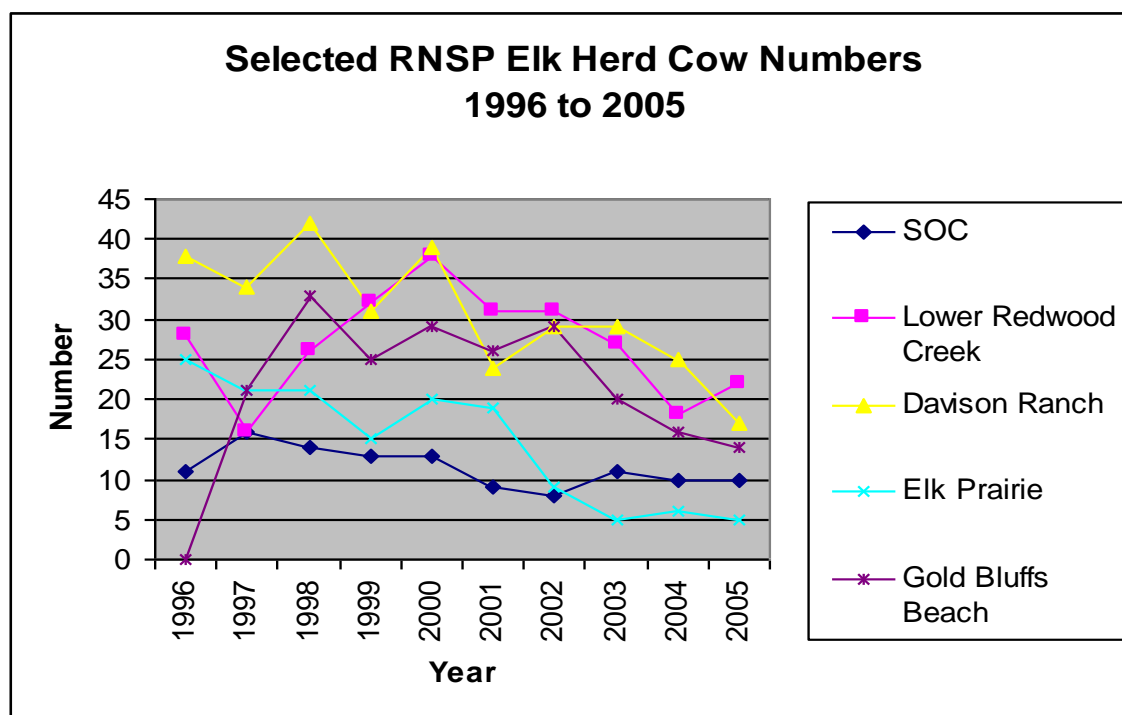
\* Only mature bulls were classified, all other elk classifications (spikes, cows, calves) were lumped together under the cow heading as directed by the Weckerly and Francis (2004) methodology (Appendix I).

**Table 2.** Highest reliable (ranking <3) cow counts for identified elk herds, 1996 to 2005.

Location	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SOC	11	16	14	13	13	9	8	11	10	10
Lower Redwood Creek	28	16	26	32	38	31	31	27	18	22
Bald Hills	78	45	98	62	104	54	35	26	71	241*
Davison Ranch	38	34	42	31	39	24	29	29	25	17
Elk Prairie/Bypass	25	21	21	15	20	19	9	5	6	5
Gold Bluffs Beach	No data	21	33	25	29	26	29	20	16	14
CBEC	No data	No data	No data	No data	16	0	23	No data	No data	30

\* 2005 was the first year the Weckerly and Francis (2004) survey methodology (Appendix I) was utilized and thus the count is not comparable to any previous survey years.

Figure 1. Selected RNSP elk herd cow numbers from 1996 to 2005 indicating herd persistence through time.



**Table 3.** Calves per 100 cows for identified elk herds, 1996 to 2005.

Location	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SOC	45	35	29	31	15	22	36	27	10	40
Redwood Creek	39	11	15	38	22	26	22	11	22	18
Bald Hills	25	20	32	32	21	19	20	12	4	N/A
Davison Ranch	23	27	18	23	41	29	21	21	24	12
Elk Prairie/Bypass	8	33	24	53	29	37	33	20	50	0
Gold Bluffs Beach	N/A	38	12	7	9	19	21	15	6	17
CBEC	N/A	N/A	N/A	N/A	13	N/A	22	N/A	N/A	N/A

*Old South Operations Center (SOC) herd*

The number of cows in this herd appears to have remained stable when compared to the past nine years of surveys and to have produced more calves and had a higher cow/calf ratio this year than in all previous years except for 1996 (Tables 2 and 3). The calf/cow ratio using the one observed calf and the highest cow count was 0.40. The bull/cow ratio was 0.2, which is considerably lower than in previous years (Bensen 2004). The highest count for the entire herd was 16.

*Lower Redwood Creek herd*

The elk in this herd appear to continue to utilize a long corridor of habitat along lower Redwood Creek extending from the confluence of Prairie and Redwood Creeks upstream to the confluence of Cloquet and Redwood Creeks. Elk herds have been seen even farther upstream in previous years, but these sightings may or may not be a separate herd. This herd also made a temporary move southwards out of the Redwood Creek bed to the old SOC area where it joined that herd for a few weeks in August. The movement was most likely the result of being hazed by local residents (Farley, pers. comm.). The size of the herd was slightly smaller than in previous years. Cow counts were the third lowest since monitoring began in 1996 and were lower than the previous six years' counts (Table 2). The calf/cow ratio was 0.18 and was also lower than in previous years (Table 3). The bull/cow ratio was 0.13. The highest count for the entire herd was 32.

*Bald Hills herd*

Elk groups in the Bald Hills continue to appear to be comprised of several discrete herds which have been observed near Ganns Prairie, Elk Camp, Airstrip, Childs Hill, Schoolhouse Peak and Maneze Prairies as well as the Coyote Creek and the Williams Ridge areas. This year's count was significantly higher than in all previous years due the switch to the Weckerly and Francis (2004) survey methodology and so is not comparable to any previous survey years. Cow/calf ratios cannot be calculated using this method because calves cannot be classified during the winter survey window – by that time of year calves are indistinguishable from cows at distances of more than 100m (pers. obs.). The bull/cow ratio was 0.06.

*Davison Ranch (Elk Meadow) / Berry Glen herd*

Like the old SOC herd, this elk herd is one of the most visible and easily accessible herds in the park. Classification counts were typically conducted under good visibility and the animals were often close enough to observe with a high confidence in accuracy. The herd continues to consist of a group of mature bulls that occupy the northern portion of Elk Meadow north to the Lost Man Creek Hatchery, and a separate group of cows, spikes, and calves that occupy the southern portion of Elk Meadow south to Skunk Cabbage Creek. The highest total count was 30, and the calf/cow ratio was 0.18. The bull/cow ratio was 0.58, with 10 mature bulls observed during three of the counts. These numbers are lower than all previous years' counts with a lower number of bulls, significant, long term downward trend in the number of cows (Table 2 and Figure 1) and relatively low productivity (Table 3).

*Elk Prairie / 101 Bypass herd*

Unlike the last two years, but like all previous survey years, this herd was more visible and relatively easy to count. The herd continues to be much smaller than it has historically been. It appears that the herd has possibly changed their primary grazing range to the Highway 101 Bypass area and away from Elk Prairie or has actually declined in number. There are a number of spots along the Bypass which are hidden from the highway itself or are unsafe to stop to survey. It is possible that the larger numbers seen in previous survey years still exist in this herd but were simply not seen this year. In addition, it continues to appear that Elk Prairie is now only being used by one small family group, as evidenced by the identical classification counts made this year, indicating that the same herd was being counted repeatedly. The highest cow count for this herd was 5, a significant drop compared to years previous to 2002 but consistent with that past two years (Table 2). The calf/cow ratio was 0 (Table 3) and was the first year that this herd produced no young since surveys began. The bull/cow ratio was 0.4 and was probably an artifact of the small herd size.

*Gold Bluff Beach herd*

Similar to the Bald Hills herd, the Gold Bluffs Beach herd seems to be comprised of several discrete sub-herds which have been observed from just south of Mussel Point to just north of Carruther's Cove. As with previous years, the most consistent sightings of a large herd occurred near the Ossagon Rocks. The highest number of cows observed in this herd was 14, the lowest cow count ever recorded for this herd and continuing a downward trend for this herd over the past three years (Table 2 and Figure 1). The calf/cow ratio was 0.17 and was approximately average for this herd (Table 3). The bull/cow ratio was 0.07. Small groups (<5) of elk or elk tracks were sometimes observed south of Major Creek and Mussel Point during plover and beach carcass surveys while small family groups and bachelor male groups continue to be consistently seen near the campground, Boat Creek mouth/marsh near the Fern Canyon parking lot and at the mouth of Espa Creek.

#### *Crescent Beach Education Center (CBEC) herd*

Fish and Wildlife branch staff did not survey the CBEC herd. However, some RNSP staff members stationed at CBEC did record elk in the meadows near CBEC when they observed them on an *ad libitum* basis. No elk were seen in the fall but a herd was consistently seen in February when calves are not distinguishable from cows – hence the lack of a cow calf ratio. The overall herd size in 2005 was the largest ever observed. There is some speculation that this herd may be the same herd seen occasionally at the Aubell facility approximately 2.5 miles to the north or that this herd mingles with the elk herd seen near the former mill site on Mill Creek in the California Department of Parks and Recreation (CDPR) acquisition area, approximately 2 miles to the east.

#### *Other*

Opportunistic visitor and staff observations were scarce this year, unlike previous years. All elk reported by visitors and staff were from the herds described above.

#### *Opportunistic Mortality Observations*

Evidence of elk death caused by vehicle collision, poaching and predation were all observed by RNSP staff this year. Two elk were killed by vehicles near the Davison herd area of US Highway 101, one unknown sex in January and one cow in March. Three elk were poached in May of unknown sex and one elk was poached in September of unknown sex in the Bald Hills herd area. Mountain lions were seen feeding on an elk carcass near the Davison herd in April and on one elk carcass each near Fern Canyon and near Major Creek on Gold Bluffs beach in May and August, respectively.

## DISCUSSION



Harper et al (1985) reported that calf/cow ratios for Roosevelt elk in Oregon average 0.39 (range = 0.32 to 0.47). The Oregon estimates were from herd units that were subject to hunting mortality. In a late 1970's RNSP study, Mandel and Kitchen (1979) reported the approximate calf/cow ratio at 0.20. The calf /cow ratios reported for the identified elk herds within RNSP during 2005 ranged widely from 0 – 0.4, with 4 herds below 0.20 and two herds not calculated. Overall, RNSP elk productivity appeared to be lower than when compared to previous years. The cause of the low productivity is unknown.

Except for the Bald Hills herd (which shifted to a new survey methodology this year), the trend in total cow numbers appears to continue to indicate a general decline in herd size. The trend has been occurring for the past three to four years, depending on the herd. The Davison, Elk Prairie and Gold Bluffs herds have halved in size over the past five years while the SOC and Lower Redwood Creek herds have remained relatively stable. Future monitoring should help to indicate whether this trend is merely a temporary fluctuation or an actual, and permanent, decline. The cause for the decline is unknown and only speculative hypotheses have been considered, including deaths of cows through vehicle collisions, poaching, and predation or a combination of all three. All three types of mortality causes were observed this year. Only targeted research will provide a definitive answer but if the decline continues for a few more years, then park managers should seriously consider making this issue a research and management priority.

As discussed previously in Bensen (2004), comparisons with Weckerly and Francis's (2004) elk monitoring numbers indicated that the park methods used for the non Bald Hills elk herds were valid because the park's results closely matched the results of the two independent researchers over the past nine years. Thus, those methods were used again for the non Bald Hills herds. And as previously recommended in Bensen (2004), the Weckerly and Francis (2004) survey method for the Bald Hills herd was utilized during 2005 and yielded results similar to past surveys conducted by B. Weckerly (pers. comm.) – i.e. significantly larger herd counts that the park had obtained over the past nine years. Unfortunately, due to the change in survey methods, population trends within the Bald Hills herd will not be known for a number of years. It is highly recommended that this survey methodology be continued for the long term in order to monitor the largest elk herd within RNSP. The method proved to be easy and efficient to implement and as shown in Weckerly and Francis (2004), is a statistically valid population monitoring technique. It is recommended, however, that if a significant decline in the Bald Hills herd cows is detected, an effort be made over the next few survey years to monitor calf production in order to determine if recruitment is also declining.

## PERSONAL COMMUNICATIONS

Farley, Corky. Law Enforcement Ranger, Visitor and Resource Protection. Redwood National and State Parks. Orick, CA.

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## Appendix I

### **Bald Hills Elk Herd Survey Methods Weckerly and Francis (2004)**

*From pages 30-31:*

In January 2004 we conducted 9 surveys. During the day and time of surveys, the same ‘collar observer’ located each radioed female by triangulation or by visually locating the group (Millspaugh et al. 2004). This observer took precautions not to disturb groups of elk containing marked (hereafter collared) animals. If obtaining a visual location was likely to disturb elk, the collar observer triangulated the location. When this individual could not spot collared elk yet elk were noticed in the direction of a strong signal, it was assumed the collared animal was in that group. When possible the collar observer enumerated size of groups containing collared and uncollared elk. The collar observer also did not communicate their findings to surveyors conducting counts.

During each survey 2 – 3 surveyors searched from a vehicle driven at 15 – 25 kph and walked to vantage points to scan visible areas of meadows not present from the road with a monocular spotting scope. We viewed the same 78 percent of the total meadow area each survey. Time to conduct surveys ranged from 4 to 7 hours and depended upon the number of elk groups detected and the ease of counting groups. Depending upon whether or not elk were obstructed by vegetation and terrain, we counted group sizes from vantage points or they were approached on foot and counted. When we approached groups on foot it was to obtain an unobstructed view or to conduct a coordinated stalk. A coordinated stalk consisted of an attempt to alert elk groups to the presence of one surveyor in such a manner that the elk group walked to an area with an unobstructed view where they could be counted by another surveyor. A female elk group was either a solitary female or a group consisting of adult and yearling females, juveniles and subadult males within 50 m proximity of one another displaying coordinated activity or movement (Weckerly et al. 2004). We combined juveniles and subadult males with females (hereafter females) because we did not detect these age-sex classes of elk by themselves or with adult males. For each group detected, we enumerated group size, tallied number of marked elk, recorded location of the group, distance of surveyors from group when group was enumerated, and classified the count as unobstructed or obstructed by vegetation and terrain. Unobstructed counts were when we considered all elk in the group in direct line of sight.

*The following six aerial photos show the winter time Bald Hills elk herd survey route (indicated by yellow line) from the Elk Camp Prairie to the Coyote Creek drainage along the Bald Hills and K & K Roads:*

